EPERETMUS, A NEW GENUS OF TRACHOMEDUSAE.

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Among a miscellaneous collection of Medusae loaned me for study by the United States National Museum is a specimen which I at first took for an *Olindias*, but which proves, on closer examination, to represent an undescribed, though related, genus.

In previous papers (1909, 1912, 1913) I have followed Browne (1904) and Maas (1905) in using the family name Petasidae for the assemblage of closely related genera, whose best-known members are *Gonionemus* and *Olindias*. But with the passage of time it becomes less and less likely that Haeckel's (1879) genus *Petasus* (on which the family name Petasidae is based) will ever be connected with any actual Medusa; hence it is increasingly probable that the name Petasidae will have to be abandoned to be replaced by Olindiidae (*sensu* Browne, 1905). Browne and I have divided the family into two subfamilies, Olindiinae and Petasinae, the former for genera in which the otocyst clubs are inclosed in a capsule (which, itself, may either stand free on the bell margin or lie inclosed in the gelatinous substance of the exumbrella or velum), or stand free on the bell margin. Mayer (1910) and Goto (1903) have used a different criterion, namely, the presence or absence of tentacular suckers, resulting in a totally different alignment of genera. But throughout the medusan series the structure of otocyst is much more significant than of tentacle. And that their system is the more artificial of the two, neither of which can, perhaps, claim to be a truly natural one, is shown by the fact that it throws into different subfamilies genera as closely related as *Gossea* and *Gonionemus*. Up to 1912 the subfamily Petasinae, as defined by Browne and me, contained only Haeckel's apocryphal genera *Petasus*, *Dipetasus*, *Petasata*, and *Petachnum*, none of which have been seen since first described. But in that year a new genus, *Nauarchus*, was added to the list, thanks to its free otocyst clubs (Bigelow, 1912). All the other genera belong to the Olindiinae.

The various Olindiinae are obviously closely related to one another, but the characters which separate them are remarkably precise for a

medusan family, the only confusion being in the case of genera insufficiently studied. They all agree in the structure, though not in the location, of the otocysts, and in the fact that the primary tentacles, which of course arise from the bell margin, turn upward as they grow older, lying in furrows of the exumbrella, so that they emerge from the bell at some height above the margin. But these tentacles may or may not bear suckers, or terminal knobs; there may or may not be a second series of marginal tentacles, or the latter may be represented by clubs; there may or may not be centripetal canals between the radials; the otocyst capsules may be free; they may be embedded in the exumbrella, or in the velum; the tentacles may be in continuous series or they may be grouped; and there may be either 4 or 6 metameres. The presence or absence of secondary tentacles and of centripetal canals, of course, allow four possible combinations of which three were previously known, while the new genus *Eperetmus*, here described, exemplifies the fourth.

The combinations of characters as found in the various genera may be illustrated by the following tabular view (which is, of course, purely artificial):

a^1. With primary tentacles only. With 4 metameres.
  b^1. Tentacles in a simple series.
    c^1. No centripetal canals.
      d^1. Otocyst capsules free.....*Aglauropsis*.
      d^2. Otocyst capsules embedded in the velum.....*Craspedacusta*.
    c^2. With centripetal canals.....*Eperetmus*, new genus.
  b^2. Tentacles in groups.
      No centripetal canals.....*Gossea*.
a^2. With primary tentacles, and secondary marginal clubs.
    With 4 metameres.
  b^1. No centripetal canals. Tentacles with suckers.....*Gonionemus*.
  b^2. With centripetal canals. Tentacles without suckers (?).....*Maeotias*.
a^3. With both primary and secondary tentacles, the former with suckers.
  b^1. With 4 metameres.
    c^1. No centripetal canals.
      d^1. 4 primary tentacles only.....*Vallentinia*.
      d^2. Many primary tentacles.....*Cubaia*.
    c^2. With centripetal canals.....*Olindias*.
  b^2. With 6 metameres.
      With centripetal canals.....*Olindioides*.

Six of these genera, *Craspedacusta*, *Gossea*, *Gonionemus*, *Cubaia*, *Olindias*, and *Olindioides*, are well known anatomically. The remaining three demand further research. One at least of them (*Vallentinia*) may finally prove to be a young stage of some other. There is no possibility, however, that this can be true of the new genus *Eperetmus*, for it is separated from most of its family relatives by positive, not negative characters, the presence of centripetal canals distinguishing it from *Aglauropsis*, *Craspedacusta*, *Gossea*, *Gonionemus*, and

Cubaia (*Vallentinia*?); the structure of the tips of the tentacles from *Olindias* and its close ally *Olindioides*. Its closest relative is apparently the genus *Maeotias* of Ostroumoff. Unfortunately, the description and figures of the latter (Ostroumoff, 1896) are not as detailed as could be wished, the structure of the tentacle tips being doubtful. But, apart from this point, *Maeotias*, like *Gonionemus*, is characterized by the presence of numerous marginal tentacular clubs, homologous with the marginal (secondary) tentacles of *Olindias* and *Olindioides*, structures entirely lacking in *Eperetmus*. And inasmuch as our specimen of the latter is apparently sexually mature, we can not suppose they would appear at a later stage. Another difference between *Eperetmus* and *Maeotias*, which may be equally important, is that whereas the older tentacles of the former emerge from the bell at a considerable height above the margin, the entodermal tentacular roots of the latter are so short that the point of emergence of the tentacles from the exumbrella is hardly appreciably above the margin. Furthermore, the otocyst capsules offer another precise differentiation between the two genera, being free in the latter, inclosed in the jelly in the former.

EPERETMUS TYPUS, new species.

Plate 59, figs. 1–8.

Albatross Station 4754; Oct. 4, 1905; lat. 55° 03′ N.; long. 131° 08′ W.; about 2 miles off Mary Island, southern Alaska; one specimen, 15 mm. in diameter, in good condition: type; Cat. No. 36301, U. S. National Museum.

Fortunately the unique specimen is in good enough condition to show all its important anatomical characters. The bell is saucer-shaped; in the preserved state (formalin) only about one-third as high as broad; the exumbrella thickly studded with minute conical prominences (fig. 2), which recall the surface roughness of *Aurelia* and some other Scyphomedusae. The velum is broad and muscular as in most related genera. The manubrium is cylindrical, hangs slightly below the bell-opening, and is seated on a short, broad peduncle (fig. 1, 4), as in *Gossea* and in *Olindias*. The lip (fig. 1) is cruciform, crenulated, and its margin thickly studded with spherical nematocyst knobs, which, being of various sizes, are probably in constant process of formation with the general growth of the Medusa (fig. 5). In all the other members of the subfamily which I have studied, i. e., *Gonionemus murbachii*, *G. vertens*, and *G. suvaensis*, *Gossea brachymera*, *Cubaia geophila*, *Olindias singularis*, *O. phosphorica*, and *Olindioides formosa*, the edge of the lip is smooth, though it may be folded. The radial, circular, and centripetal canals are notably broad and flat. Of the latter there are 4, 4, 4, and 5 in the respective quadrants, one inter-

radial, two adradials, and one or two subradials in each quadrant. And their respective lengths, the former longest, the latter shortest, show that they are developed in that relative order. The interradials reach hardly half way from margin to apex (fig. 1), i. e., are relatively shorter than in *Olindias* or *Olindioides;* but perhaps they had not reached their final development.

The gonads occupy most of the length of the radial canals, leaving only short proximal and distal portions bare (fig. 4). In the one specimen they are simple, narrow folds hanging vertical from the oral sides of the canals, folded in a slightly wavy fashion, i. e., much as in half grown *Gonionemus murbachii* and *G. vertens,* without any trace of the papilliform processes so characteristic of *Olindias.*

The structure and location of the marginal organs, i. e., tentacles and otocysts, is as follows. As pointed out above, the tentacles are all of one kind, corresponding both in structure and in location to the primary tentacles of *Olindias;* and not only are there no velar tentacles; but even the marginal tentacular bulbs, so characteristic of *Gonionemus,* are likewise lacking. The total number of tentacles is 107, i. e., 28, 22, 24, and 29 in each quadrant, besides the four radials, of various sizes, and evidently of various ages. The four radials are largest; next in size are the four interradials, situated opposite the four interradial centripetal canals; next the eight adradials, corresponding to the eight adradial canals. In each quadrant there are one or two other large tentacles (opposite the subradial canals); and a considerable number of small ones, showing every stage in development from mere knobs to fully formed organs. Evidently the order of development for tentacles, as for canals, is radial, interradial, adradial, followed by subradials in irregular succession. The very youngest tentacles stand freely on the bell margin, pointing downward. But as they grow older (as illustrated by tentacles of successive sizes) they turn upward against the bell (fig. 2), and come to lie in grooves in the exumbrella. In the case of the largest tentacles these grooves are very deep (fig. 3), but they are all open, the jelly never closing over the root of the tentacle; and the oldest tentacles are so large that probably this is the final state.

There is a thick, opaque kidney-shaped nematocyst pad (fig. 2) associated with each large tentacle, lining the distal end of the groove in which it lies; itself forming a groove roughly triangular in cross section, and continuous both with the exumbrella and with the ectoderm of the oral face of the base of the tentacle (fig. 3). These pads vary in size with the size and age of the tentacles to which they belong, and are foreshadowed in the very youngest, which project free from the margin, by a thickening of the ectoderm at the base (fig. 2). The oldest tentacles emerge from the surface of the bell at about one-fifth the distance from the margin to apex; the younger

ones successively lower and lower down. The tentacles are soft and flexible, the outer part of the older ones ringed with nematocyst ridges (fig. 6, 7). Few, if any, of the latter form complete rings; but no definite zone is free from them, a character in which the tentacles agree with the primary, but not the secondary, tentacles of *Olindias*, and with the tentacles of *Gonionemus*. The basal half of the large tentacles is smooth. In the young tentacles the smooth portion is relatively shorter; in the youngest the whole length is ringed with nematocyst ridges. The tips of all the tentacles, young and old, bear spherical knobs composed of closely crowned nematocysts, radially arranged; a termination very different from the suckers on the primary tentacles of *Olindias*, but suggesting the terminal knobs of the secondary tentacles of that genus; and practically indistinguishable from the tips of the tentacles in *Nauarchus* and *Gossea*.

The otocysts alternate roughly with the tentacles (fig. 2) instead of lying close to them, as in *Olindias*, and are about as numerous, i. e., a total of about 160; like the tentacles, they show various stages in development from newly formed to adult. Structurally the sense organs closely resemble those of *Olindias* and *Olindioides* (Goto 1903); each consisting of an otolith, apparently enclosed by a thin protoplasmic layer, situated on a short protoplasmic stalk containing nuclei, but without visible cell walls. The organ is enclosed in a thin walled capsule, situated in close contact with the outer edge of the aboral wall of the circular canal, the whole deeply imbedded in, and entirely enclosed by the gelatinous substance of the bell. The position of the otocyst and its relation to the tentacle root, nerve ring, and circular canal is shown by a radial section through the disk (fig. 8). The otocysts differ from those of *Olindias*, in invariably having one otolith only, as seems to be the case in *Olindioides* also.

Color.—In the preserved state the nematocyst pads at the base of the large tentacles, the manubrium, and gonads are pale, but opaque yellow; otherwise the specimen is colorless.

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EXPLANATION OF PLATE 59

Fig. 1. *Eperetmus typus:* aboral view of one quadrant of the type-specimen, to show tentacles, canal system, and manubrium.

2. Aboral view of a segment of the marginal zone, to show otocysts (*O*), and young (T^1) and old (T^2) tentacles. (*N*), nematocyst pad; (*V*), velum.

3. Dissection of the marginal part of the bell, to show the exumbral furrows (*F*), nematocyst pads (*N*) and old and young tentacles (T^2, T^1) in cross section.

4. Radial section of bell, showing gonad (*G*) and base of manubrium (*M*).

5. Part of the margin of the lip.

6. A half-grown tentacle.

7. Tip of adult tentacle, showing nematocyst rings and terminal nematocyst knob.

8. Radial dissection of margin seen somewhat obliquely, to show position of the otocyst. (*T.*), entodermal core of half-grown tentacle; (*N*), nematocyst pad of same; (*C C*), circular canal; (*Ca*), capsule of otocyst; (*O T*), otolith; (*V*), velum.